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| **Project Title**: | **Intensification of maize-legume based systems in the semi-arid areas of Tanzania (Kongwa and Kiteto districts) to increase farm productivity and improves farming natural resource base** |
| **Grant Agency** | AFRICA RISING: Africa RISING East and Southern Africa Research Action-IITA |
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| **Organization: International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)** | |
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| **Country** | Tanzania – Kongwa and Kiteto Districts |
| **Principal Investigator** | Dr Patrick Okori, Principal Scientist (Plant Breeding) ICRISAT Malawi |
| **Implementing Partners**  (National Agricultural Research System, Universities and other Research Organizations) | CIMMYT  ICRAF  ARI Hombolo  ARI Naliendele  Sokoine University of Agriculture  University of Dodoma |
| **Development Partners** | NAFAKA |
| **Period of activity** | 1 year |
| **Amount requested** | **$ 500, 000** for one year |

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# SUMMARY

This proposal is a follow up of activities initially conducted in 2011- 2012 as part of the Africa RISING activities in Tanzania targeting the districts of Kongwa and Kiteto. Based on the lessons learnt, we now propose wider and intensified activities that will harness on-farm adoptive and developmental research collaboration between researchers from the CGIAR Centers and the NARS. Project deliverables will contribute to CGIAR Research programme (CRP) 3.5 that aims at leveraging legumes to combat poverty, hunger malnutrition and environmental degradation; And CRP 3.2 that aims at double maize productivity through intensive, sustainable, and resilient farming. This effort will enhance access to, as well as use of technologies by smallholder farmers to improve their productivity and livelihoods. We seek to achieve outputs that will lead to the desired program research and development outcomes. Our specific project outcomes are (**a**) Increased productivity of maize and legume -based cropping systems with yield increases of up to 100% and 80% for maize and pigeon pea, respectively, and ameliorate food security and nutrition security and poverty; (**b**) Improved land productivity (greater returns to investments, labour productivity and per unit outputs) and ecosystem management leading to sustainable and resilient and productive farming and cropping systems in the project areas. Both Project outcomes will contribute to the Programme objectives 1, 2 and 3 which focus on evaluation and promotion of demand-driven options for sustainable intensification, scaling-up delivery and maintaining or improving ecosystem stability. Actions are clustered into seven work packages for coherence and better delivery. The seven work packages include: (i) On-farm evaluation of improved legume and cereals varieties for promotional activities, (ii) Integrated soil fertility management in action areas, (iii) Land management (soil and water conservation), (iv) Post harvest processing, utilization and nutrition, (v) Crop livestock and poultry integration and productivity enhancement, (vi) Characterization of Africa RISING sites and (vii) Lesson learning, networking and coordination. The activities will build on efforts by NAFAKA. [[1]](#footnote-1)

# 1. DESCRIPTION OF INTENDED WORK PLAN

## 1.1 The problem

Agriculture is a fundamental part of Tanzania’s economy. In 2010, Tanzania signed the Comprehensive Africa Agricultural Development Strategy Compact signaling commitment to agricultural development as the vehicle for transformation of the country’s agriculture (URT, 2010[[2]](#footnote-2)). Today, Tanzania is implementing the Agricultural Sector Development Programme (ASDP) in the mainland and the Agricultural Strategic Plan (ASP) in Zanzibar as home-grown, decentralized, community-led initiatives developed through rigorous multi-stakeholder consultative processes. According to the ASDP, about 80 % of the poor people in Tanzania live in rural areas with agriculture accounting for 75% of rural household incomes. Thus significant reductions in overall poverty levels, particularly rural poverty, in Tanzania will require raising agricultural incomes.

Key constraints to achieving Tanzania’s agricultural growth targets include among others,

1. Under-investment in productivity enhancing technologies.
2. Limited access to technology demand and delivery channels – with 60-75% of households estimated to have no contact with research and extension services;
3. Limited access to financing for the uptake of technologies;
4. Un-managed risks with significant exposure to variability in weather patterns with periodic droughts. The impact of these events is amplified by the dependency on rain fed agriculture and the limited capacity to manage land and water resources;

Box 1. Key constraints to increasing productivity in Tanzania agriculture (ASDP, 2005[[3]](#footnote-3))

In semiarid zones of Tanzania some of the major challenges to increased agricultural productivity include:

1. **Low productivity of crops and livestock sub sectors**. People living in arid and semi-arid regions that depend exclusively on livestock and food crop production.
2. **Fragility of production to market systems**. Their systems are fragile systems and therefore without interventions cannot support high levels of crops and livestock production.
3. **Vulnerability of communities**. High vulnerability of communities living in such communities to weather and other natural disaster related challenges. The people of the central and northern highlands are nutritionally the most deficient; register the severest levels of poverty (IFAD[[4]](#footnote-4), 2001).
4. **High levels of poverty**: The incidence of poverty varies greatly across the country, but is highest among rural families. Studies show that Dodoma among the semi-arid zones of Tanzania has one of the highest percentage of people living below the food poverty line at 35.5% and up to 51.4% based on expenditures[[5]](#footnote-5)

This proposed on-farm adaptive and developmental research collaboration between researchers from the CGIAR Centers and the NARS, will contribute to enhanced access to and utilization of low-cost technologies by poor smallholder farmers of Tanzania to improve their crop productivity. It is based upon an understanding of the physical, economic and social barriers that reduce the effectiveness of smallholder farmers to adapt or adopt improved farming technologies. It offers possible solutions in a stepwise, iterative manner that will lead to improved food security, better nutrition and environmentalsustainability. It relies heavily on wider adoption of recently developed improved crop cultivars and crop management practices for their multiple benefits of food, feed, energy, and resilience of production systems. The project depends on both improved technologies and integration of nutrition information that link farming and marketing practices to nutrition and health outcomes of vulnerable populations. Increased value addition, income from marketing and other related activities contributes to nutritional status by allowing a diversification of diets with on-farm and purchased foods. The complementarity of cereals and grain legumes and the integration of livestock will contribute to a balanced household diet and diversified livelihood strategies. To this end, methods of eliminating the need for emergency food, malnutrition and relief effort in semi-arid zones of Kongwa and Kiteto Districts in Tanzania during 2012/2013 cropping season would be mainly through increased farm productivity that are underpinned by sustainable intensification principles. The proposed project seeks to introduce promising early and drought tolerant maize varieties, inorganic/ organic fertilizers and legume crops that enhance Biological Nitrogen Fixations (BNF) among others, as a strategy for yield enhancement, soil fertility improvement and ecosystem stability.

## 1.2 Intended outcomes and underlying assumptions for their achievement

### 1.2.1 Intended outcomes

1. **Outcome 1.** Increased crop yields in maize-based farming systems by up to 100% for cereals and 80% for legumes in semi-arid zones of Tanzania. This will lead to enhanced opportunities to address food security, nutrition and poverty challenges as well as improve market opportunities. This outcome will contribute to the programme objective 2 on Integrated systems improvement
2. **Outcome 2.** Improved land productivity (greater returns to investments, labour productivity and per unit outputs) in target areas of operation lead to more resilient, robust agro-ecologies and productive farming and crop systems of communities in semi-arid zones of Tanzania. This outcome will contribute to the programme objectives 2 and 3 on integrated systems improvement, and scaling and delivery, respectively.

### 1.2.2 Assumptions

1. Opportunities to improve access to improved seed and related technologies by majority of farming communities in semi-arid areas of Tanzania are optimal to support intensification efforts in target areas.
2. Farmer organisations and institutions are functional and committed to the project actions, especially in scaling up and out in target districts.
3. Tanzanian government policy remain supportive for investing in agricultural growth in Tanzania and the target regions overall.
4. National partners have ownership and continue providing adequate support for smooth implementation of Africa Rising interventions.
5. Existing tenure systems allows for farm/plot to landscape level interventions in target communities.

# 2. RESEARCH HYPOTHESES TO BE ADDRESSED, DELIVERABLES

## 2.1 Research hypothesis

1. Introduction of early and intermediate maturing drought tolerant varieties of maize and grain legumes in semi-arid areas of Tanzania will improve crop productivity and ultimately enhance household food security, nutrition and income.
2. Adoption of soil moisture conservation technologies in drought prone areas of Tanzania will reduce crop failure and improve overall productivity.
3. Adoption of integrated soils fertility management technologies will improve soils fertility status and hence increased crop productivity.
4. Integrated approaches to sustainable intensification provide better options to strengthen livelihoods strategies of farmers in semi-arid areas of Tanzania than the currently used non- cohesive farming practices.

## 2.2 Research deliverables

The project will be implemented via five research for developed work packages that will lead to delivery of the under listed outputs:

1. **Output 1. Introduce and evaluate improved varieties of maize and grain legumes.** The focus shall be to validate and disseminate best-bet management packages around the most promising new crop varieties suited to semiarid agro-ecological zones. This output will contribute to outcome 1 of our intervention and objective 2 of the Africa RISING Programme.
2. **Output 2. Evaluate integrated soil fertility management options to improve plant nutrition and yields of crops and enhance agro-ecosystem resilience in action areas**. The focus will be on developing scenarios for sustainable production of identified crop varieties that contribute to sustainable agricultural resource management and offer nutritional and marketing advantages. This output will contribute to outcome 2 of our intervention and objective 2 of the Africa RISING programme.
3. **Output 3**. Validate and promote **land management options for sustainable agricultural intensification (soil and water conservation) in action areas**. This output will validate and promote economically viable and socially acceptable innovations that maintain and enhance production, reduce the level of crop production risk, conserve natural resources and prevent degradation of soil and foster agricultural biodiversity through the introduction of physical and biological measures. This objective will contribute to outcome 2 of our intervention and objective 2 of the programme.
4. **Output 4. Post-harvest processing and utilization.** This objective will contribute to improving household food and nutrition securityamong the most vulnerable households and their members, especially women and children. Special effort shall be made available to women farmers as technical innovators, resource managers and homemakers. This objective will contribute to outcome 1 of our intervention and objective 2 of the programme.
5. **Output 5**. **Crop- livestock (cattle, small ruminants/poultry) integration and productivity enhancement.** This objective will contribute to improving household food and nutrition security among the most vulnerable households; this objective will contribute to outcome 1and 2 of our intervention and objective 2 and 3 of the programme.

# 3. APPROACH: DESCRIPTION OF WORK PACKAGES

## 3.1 Work package 1. On-farm evaluation of improved legume and cereals varieties

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| **Work package number** | **WP 1** | **Start date or starting event:** | | | | | November 2012 to September 2013 | |
| **Work package title** | On-farm evaluation of improved legume and cereals varieties | | | | | | | |
| **Activity Type** | Action research, capacity building for farmers and extension staff | | | | | | | |
| **Target areas (Districts- Villages** | Chitego | | Laikala | Mlali | Moleti | Mvugala | |  |
| **WP leader** | ICRISAT | | | | | | | |
| **Partners** | ARI-Hombolo | | NAFAKA | CIMMYT | SUA | ARI-Naliendele, | | SARI |
| **WP budget (USD)** | 163,195 | | | | | | | |

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| **Relevant Africa Rising Objective 2: Integrated systems improvement** |
| **Key intervention areas:**  Introduce and evaluate improved varieties of maize and grain legume crops to farm households in a manner that complements their on-going farm enterprises and improves their productivity |

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| **Description of work**  **Task 1.1.** **Community mobilization for the action.** The aim of this activity is to prepare the communities in the two districts to engage in the action. The following activities will be done.  **Sub task 1.1.1** **Farmer and site selection.** Farmers willing to provide land for trials will be selected with help of village extension officer, village leadership NAFAKA, DALDOs and ARI Hombolo following general sensitization in target villages. Gender dimensions for soils and water management including impacts of land tenure on adoption of the proposed technologies will be part of each implementation.  **Task 1.2. Description of experiments -Maize**  **Subtask 1.2.1. Maize**. The aim is to evaluate the performance of stress tolerant maize varieties under farmer field conditions for adaptation. Six new early and intermediate maturity drought tolerant and two locally available maize varieties will be evaluated using mother-baby trial approach. The mother trial (8 varieties) will be established at 10 locations; each mother trial will have five (5) baby trials (4 varieties) in the neighboring farmer’s plots. The mother trials will be researcher managed while the baby trials will be under farmer management. Data on yield and farmer preference will be collected and used to inform adoption strategies.  **Quality Protein Maize (QPM) Variety Demonstration -** QPM has been developed to reduce human malnutrition in areas where protein deficiency is prevalent and maize is the major source of protein in the diet. Breeding efforts have led to the development and release of QPM varieties that have been released in Tanzania. Farmers in the target area have not been exposed to these varieties. The objective of this work is to test the adaptability of these varieties under farmer managed conditions. The three released varieties (Lishe K1, Lishe H1 and TANH611) and one farmer preferred variety will be planted in on-farm demo plots at five (5) locations. The plot sizes will be 10 m x 10 m. Farmer assessment of the varieties will be carried out at harvest.  **Task 1. 2**. **Description of experiments-legumes**  **Sub-task** **1.2.1** **Pigeonpea**. The aim is to evaluate performance of improved pigeon pea varieties under farmer field conditions for adaptation (yield, resilience to pests, diseases and drought and farmer preference etc.). Three pigeon pea varieties will be evaluated using participatory variety selection approaches at few representative locations. Large number of demonstrations will be conducted in each target village involving released variety (Mali-ICEAP 00040) material is mainly for grain but may perform other agro forestry needs, along with local varieties grown by farmers. Data will be collected and used to inform adoption and promotion strategies for the improved pigeon pea varieties. Strategic partnerships with NAFAKA farmers will be used in demonstration.  **Sub-task 1.2.2. Groundnuts**. The aim is to evaluate performance of improved groundnut varieties under farmer field conditions for adaptation (yield, resilience to rosette and drought and farmer preference etc.). Three new varieties will be evaluated using participatory variety selection approaches. Data will be collected and used to inform adoption and promotion strategies for the promising improved groundnut varieties. Strategic partnerships with NAFAKA farmers will be used in demonstration.  **Task 1.2.3 Pilot seed production for groundnuts and pigeonpea at community level.** In collaboration with NAFAKA identify farmers to develop and pilot a community based seed production in target areas through Quality Declared Seed (QDS) Production Model.ICRISAT will backstop the process. |
| **Deliverables**  There are four deliverables under this work package i.e.   1. At least two adapted varieties of maize identified for target areas 2. At least two adapted varieties of pigeonpea identified for target areas 3. At least two adapted varieties of groundnuts identified for target areas 4. Strategies for community based seed production piloted and validated for up-scaling |

## Work package 2. Integrated soil fertility management in action areas

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| **Work package number** | **WP 2** | **Start date or starting event:** | | | November 2012 to September 2013 | | |
| **Work package title** | Integrated soil fertility management in action areas | | | | | | |
| **Activity Type** | Action research type, R&T, participatory and promotional action | | | | | | |
| **Target areas (Districts- Villages** | Chitego | Laikala | Mlali | Moleti | Mvugala |  |  |
| **WP leader** | ICRAF | | | | | | |
| Partners | ARI-Hombolo | NAFAKA | SUA | IRA | ICRISAT | CIMMYT | |
| **WP budget (USD)** | 71, 881 | | | | | | |

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| **Relevant Africa Rising Objective: Objective 3 on Scaling up and delivery** |
| **Key intervention areas:**   1. Develop scenarios for sustainable production of identified crop varieties that contribute to sustainable agricultural resource management and offer nutritional and marketing advantages. 2. Validate and disseminate best-bet management packages around the most promising new crop varieties suited to widely representative agro-ecological zones. |

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| **Description of work**  **Task 2.1.** **Community mobilization for the action.** The aim of this activity is to prepare the communities in the two districts to engage in the action. The following activities will be done.  **Sub task 2.1.1** **Farmer and site selection.** Farmers willing to provide land for trials will be selected with help of village leadership NAFAKA, DALDOs and ARI following general sensitization in target villages. Gender dimensions as they relate to this WP will be considered at this stage and throughout implementation.  **Task 2.2 Targeting fertilizer applications**. The aim of the WP is address the problem of applying blanket fertilizer rates, which are often ineffective in overcoming nutrient limitations to crops growth. Overall, recent work by ICRAF (Kimaro et al., 2012[[6]](#footnote-6)) and NAFAKA in Kongwa and Kiteto indicate low levels of nitrogen, phosphorus and carbon, and marginal to high levels of other macro and micronutrients in the soil. Hence diagnostic trials will be conducted in selected sites to identify and rank limiting nutrients in the study sites. Improved varieties of maize and pigeon pea evaluated in the other WPs will be used as test crops. Results of this study will be used to design fertilizer recommendation trials in subsequent years. Vector analysis techniques (Isaac and Kimaro, 2011[[7]](#footnote-7)) will be employed to diagnose and rank nutrient limitations. Application rates for fertilizer trials will be selected to allow the development of fertilizer response curve to guide optimal application rates recommendations.  **Task 2.3 Efficient nutrient use**. Studies will be conducted following biophysical baselines in Africa RISING sites and the NAFAKA baseline report in target areas to evaluate and promote the integration of organic, and inorganic nutrient sources, such as fertilizers, manure and leguminous crops and s and shrubs, for improving soil fertility and crop productivity. This WP will also explore synergies from the combined use of organic and inorganic nutrient sources such as improved nutrient use efficiency and soil moisture relations (Drinkwater and Snapp, 2007[[8]](#footnote-8)). Small-scale farmers will evaluate the potential for locally available organic sources to minimize inputs of industrial fertilizers without compromising crops yields as an entry point to promote fertilizer use.  **Sub task. 2.3.1.** **Improving perception on use of inorganic fertilizers**. There are various myths and facts about use and effects of fertilizer on soils and farm productivity among researchers, politicians and small-scale farmers (VanLauwe et al., 200[[9]](#footnote-9)). This work WP aims to overcome the existing misconceptions among Africa RISING stakeholders such as the assertion that use of inorganic fertilizer destroys soils (Kimaro et al., 2012) through participatory learning and sensitization activities to support behavioral change with regard to use and impacts of inorganic fertilizers among farmers. On-farm trials on soil fertility replenishments to be established in this and other WPs will be used for demonstrating to allow for experiential learning. Sensitization activities will include but not limited to seminars and workshop for farmers and extension officers using various training materials such the recently release ISFM handbook  **Sub task 2.3.2 Evaluation of intercropping technologies as part of ISFM**. This will involve growing of more than one crop simultaneously in the same piece of land notably cereals and legume plant to fully exploit ecological benefits such as efficient use of growing space, nutrients, higher total yields and farm diversification to minimize the risk of total crop failure common in semi-arid zones. Pigeon pea in particular act as nutrient pump to recycle nutrients that have leached deeper horizons and is considered compatible to cereals even in dry environments because inherently slow growth relative to most cereals provides temporal complementarity in resource use and minimize interspecific competition under intercropping (Snapp et al., 2002[[10]](#footnote-10); Kamaro et al 2009[[11]](#footnote-11)). Thus clear understanding of spatial arrangement and density of interacting plants in mixtures is a critical agronomic practice influencing the benefits arising from the balance between positive (facilitative and complementarity) interactions and negative (competitive) interactions in intercropping (Kimaro et al., 2009). This WP therefore will evaluate appropriate spatial arrangements (Single alternate row, double alternate row and rotations) needed for intercropping the introduced maize and legume verities in Kongwa and Kiteto. The focal crops will be maize, pigeonpea, and/or groundnuts. The potential for improving soil fertility and productivity by adopting these practices will also be evaluated based on farm level biophysical baselines in WP 6. Various techniques such as vector completion analysis (Kimaro et al., 2009; Isaac and Kimaro, 2011) and the Land Equivalent Ratio (Vandermeer, 1989[[12]](#footnote-12)) will be adopted to assess ecological interactions in mixture to guide recommendations on spatial arrangements.  **Sub task. 2.3.4** **Cost benefits analyses**. This will be done to support promotional activities. It will also include design of practical measures to support use of both organic and inorganic fertilizers. |
| **Deliverables**  There are four deliverables under this work package i.e.   1. Major limiting soil nutrients for crop production identified to guide fertilizer trials design 2. Improved in-organic fertilizer usage by farmers in NAFAKA operational areas 3. Strategies for use of intercropping to improve soils fertility and yield of introduced varieties will be developed and readied for up and out-scaling. 4. Cost benefits analysis for various soil nutrient replenishment options determined to support up and out-scaling activities. |

## Work package 3. Land management (soil and water conservation) in action areas

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| **Work package number** | **WP 3** | **Start date or starting event:** | | | November, 2012 to September 2013 |
| **Work package title** | Land management (soil and water conservation) in action areas | | | | |
| **Activity Type** | Action research type, R&T, participatory and promotional action | | | | |
| **Target areas (Districts- Villages** | Chitego | Laikala | Mlali | Moleti | Mvugala |
| **WP leader** | ARI-Hombolo | | | | |
| **Partners** | ICRAF | NAFAKA | SUA | IRA | ICRISAT |
| **WP budget (USD)** | 49, 619 | | | | |

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| **Relevant Africa Rising Objective: Objective 3 on Scaling up and delivery** |
| **Key intervention areas:**   1. **Best bets**. Develop scenarios for sustainable production of identified crop varieties (Step 2) that contribute to sustainable agricultural resource management and offer nutritional and marketing advantages 2. **Resource conservation**. Protect land and water resources and foster agricultural biodiversity through the introduction and management of physical and biological measures |

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| **Description of work**  **Task 3.1.** **Community mobilization for the action.** The aim of this activity is to prepare the communities in the two districts to engage in the action. The following activities will be done.  **Sub task 3.1.1** **Farmer and site selection.** Farmers willing to provide land for trials will be selected with help of village leadership NAFAKA, DALDOs and ARI following general sensitization for erosion control in target villages. Gender dimensions for soils and water management including impacts of land tenure on adoption of the proposed technologies will be part of each implementation.  **Task 3.2. Soil and water conservation**. Activities will be done at landscape levels focusing on the following sub- tasks.  **Sub task 3.2.1. Soil erosion management technologies**. The aim is to reduce land degradation due to erosion and improve crop productivity per raindrop (Rainwater use efficiency) as a strategy to enhance resilience of maize-based farming systems in targeted areas. Approaches to minimize erosion will be evaluated on farm. Technologies such as contour bands and ridges reinforced with leguminous shrubs and relevant bush species and elephant grass will be explored. In addition to controlling erosion, these technologies are known to improve soil moisture availability to rooting zone, cereals yields, and enhance rainwater use efficiency (RUE) in semi-arid areas. Besides RUE, this WP will evaluate other environmental benefits such as increased above-and belowground carbon stocks (carbon sequestration potential) and improved land quality following reduced erosion and the introduction of shrubs and vegetation to stabilize contour bands and ridges. In order to integrate livestock into the system, fodder grass or tree/shrubs species will be planted on the soil erosion control structures and evaluated along with other livestock based intervention detailed in WP 5. Thus Action research will be conducted at both NAFAKA and new Africa RISING sites to assess the impacts of soil erosion and water conservation technologies on soil moisture, yields of improved cereal and legumes species/crops, RUE and carbon stocks.  **Sub task 3.2.2. Soil water management technologies**. Activities will include *in-situ* rainwater harvesting technologies such as ripping, ridging, and conventional tillage. Action research on these interventions including use of improved cereal and legumes species/crops will be conducted at both NAFAKA and new action sites.  **Sub task. 3.2.3** **Cost benefits analyses**. This will be done to support promotional activities. It will also include design of practical measures to support use of soils and water management strategies. |
| **Deliverables**   1. Best bet soil water conservation technologies validated for up-scaling. 2. Impact of soil and water conservation technologies on above and below ground carbon stock and land productivity by conservation technologies used will be quantified. 3. Reduced land degradation and better land productivity among farmers in NAFAKA and other target operational areas. 4. Strategies for improve soils and water management will be developed and readied for up and out-scaling. 5. Cost benefits for soils and water management will be determined to support up and out-scaling activities. |

## Work package 4. Post harvest processing, utilization and nutrition

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| **Work package number** | **WP 4** | **Start date or starting event:** | | | |  | |
| **Work package title** | Post harvest processing, utilization and nutrition | | | | | | |
| **Activity Type** | R&D, R&T, participatory and promotional action | | | | | | |
| **Target areas (Districts- Villages** | Chitego | Laikala | | Mlali | Moleti | Mvugala |  |
| **WP leader** | ICRISAT | | | | | | |
| **Partners** | ARI-Hombolo | | SUA | CIMMYT |  | | |
| **WP budget (USD)** | 57, 115 | | | | | | |

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| **Relevant Africa Rising Objective: Objective 2 on Integrated systems improvement** |
| **Key intervention areas:**   * **Household nutrition**. Increase food security and improve household nutrition among the most vulnerable households and their members, especially women and children. * **Gender empowerment**. Realize the special opportunities available to women farmers as technological innovators, resource managers and homemakers. |

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| **Description of work**  **Task 4.1. Appropriate technology for storage**.This task will build upon the work started under jumpstart phase of this project targeting improvement of storage to minimize post harvest losses.This work willfocus on up scaling of the technology in selected communities. Initial work will be done at NAFAKA sites where the communities have already been mobilized. Scaling-up and out action will be done in new areas after validation at NAFAKA sites.  **Task 4.2. Processing and utilization of legumes.** The activity aims at improving consumption of these legumes as part of our efforts to improve nutrition status of households in target communities. Two legumes will be usedi.e. groundnuts and pigeon peas. Their consumption together with staple cereals will be explored for up and out scaling purposed.  **Sub tasks 4.1.1. Processing of pigeon pea and utilization**.Processing technologies for pigeonpea grain available at ARI will be tested with communities at pilot level in order to learn lessons. Demonstrations for utilization such as *Bonko, Mseto, Ngande* and *Dhali,* as well as recipes for cooking will be made available to households. This action will be implemented in partnership with relevant ARI and other associate partners, who will be contacted in course of the project.  **Sub tasks 4.1.2 Processing of groundnuts and utilization**.Processing technologies for groundnuts available will be tested with communities at pilot level in order to learn lessons. Demonstrations for processing as well as recipes for cooking groundnuts will be made available to households. This action will be implemented in partnership with relevant ARI and other associate partners who will be contacted in course of the project.  **Task 4.2. Food safety**.The aim of this action is to minimize the extent of food contamination especially bymycotoxins. The mycotoxin aflatoxin is one of the major concerns associated with groundnuts and affects food safety at household level as well as for trade. Awareness campaigns on aflatoxin will be made and relevant publicity media used as well. On farm contamination will be minimized using pre and post harvest management. This action will be implemented in partnership with relevant ARI and other associate partners who will be contacted in course of the project.  **Task 4.3 Household nutrition based on cereals.** This task aims at improving nutrition of households especially protein. Quality protein maize (QPM) varieties released in Tanzania will be evaluated at experimental level at test sites for adaptability as part of a first step to underpin its promotion in the target communities. This work will be led by CIMMYT in partnership with Tanseed International. Efforts to evaluate pro-vitamin A maize will be made and tested for adaptability in target areas in partnerships with ARI and national partners. |
| **Deliverables**   1. Appropriate technology for storage for improvement of storage to minimize losses due to storage pests in target areas validated for up-scaling. 2. Various recipes of cooking pigeonpea made available as part of a strategy to improve household nutrition 3. Various recipes of cooking groundnuts made available as part of a strategy to improve household nutrition 4. Farmers sensitized on extent of contamination as well as the health hazards associated with aflatoxin contamination. Mitigation efforts at pre and post-harvest will be made available. |

## Work package 5. Crop livestock and poultry integration and productivity enhancement

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| **Work package number** | **WP 5** | **Start date or starting event:** | | |  | | |
| **Work package title** | Crop livestock and poultry integration and productivity enhancement | | | | | | |
| **Activity Type** | Action research type, participatory and promotional action | | | | | | |
| **Target areas (Districts- Villages** | Chitego | Laikala | Mlali | Moleti | Mvugala | |  |
| **WP leader** | ICRAF | | | | | | |
| **Partners** | UDOM | Pasture Research Center Kongwa | ARI-Hombolo | | |  | |
| **WP budget (USD)** | 21, 353 | | | | | | |

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| **Relevant Africa Rising Objective: Objective 2 on Integrated systems improvement** |
| **Key intervention areas:**   * **Resource conservation**. Protect land and water resources and foster agricultural biodiversity through the introduction and management of physical and biological measures. * **Improved household nutrition**. Increase food security and improve household nutrition among the most vulnerable households and their members, especially women and children. * **Gender empowerment**. Realize the special opportunities available to women farmers as technical innovators, resource managers and homemakers. |

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| **Description of work**  **Task 5.1.** **Community mobilization for the action.** The aim of this activity is to prepare the communities in the two districts to engage in the action. The following activities will be done. Farmers willing will be engaged to develop an action map related to livestock/ crop integration as part of Land improvement programme. Gender dimensions and impacts of land tenure on adoption of the proposed technologies will be part of each implementation.  **Task 5.2. Integrated crop/livestock productivity enhancement.** Agroforestry based interventions for fodder and pasture quality management will be evaluated. This will involve characterization of fodder quality of indigenous tree species adaptability and feed quality for browsing. The use of fodder tree and shrub species as part of soil fertility management and for stabilizing soil and water conservation structures, like contours bands will be evaluated for integration in WP 3. Efforts will be made to demonstrate at household level how to improve pastures by providing farmers with leguminous species and by training on nursery techniques for raising appropriate tree species locally. This action will be done in partnership with livestock feeds specialists from the Pasture Research Centre Kongwa-Tanzania and the University of Dodoma. As appropriate poultry health enhancement may be addressed  **Task 5.3**. **Poultry feeds/production.** Issues on poultry feeds will be explored in partnership with NAFAKA and ILRIand NARS to include an action in year 3 and beyond. Baselines information on livestock ownership will be used to inform this process and plan the appropriate interventions. |
| **Deliverables**   1. Nutritional quality of indigenous fodder tree species characterized for inclusion in local pasture systems. 2. One M.Sc. students trained in tree fodder quality assessment by supporting the research component 3. Identification of appropriate fodder trees and shrubs for integration in maize-based farming systems as part of sustainable land (soil and/or water conservation) management options 4. Intervention options for poultry identified |

## Work package 6. Characterization of Africa RISING sites

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Work package number** | **WP 6** | **Start date or starting event:** | | | | | November 2012 to September 2013 | | |
| **Work package title** | Characterization of Africa RISING sites | | | | | | | | |
| **Activity Type** | Action research type, participatory and promotional action | | | | | | | | |
| **Target areas (Districts- Villages** | Chitego | | Laikala | | Mlali | Moleti | Mvugala |  |  |
| **WP leader** | ICRAF | | | | | | | | |
| **Partners** | ARI-Hombolo | | | SUA |  | | | | |
| **WP budget (USD)** | 29, 433 | | | | | | | | |

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| **Relevant Africa Rising Objective: Objective 1 on Situation Analysis (biophysical baselines)** |
| **Key intervention areas:**  **Resource conservation**. Conservation of the natural resource base, especially soils, needed to support SI options. |

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| **Description of work**  **Task 6.1.** **Community mobilization for the action.** The aim of this activity is to prepare the communities in the two districts to engage in the action. The following activities will be done. Farmers willing will be engaged to develop an action map related to livestock/ crop integration as part of Land improvement programme. The sensitization meetings will be done with the help of village leadership, NAFAKA, DALDOs and ARI. Gender dimensions and impacts of land tenure on adoption of the proposed technologies will be part of each implementation.  **Sub task. 6.2** **Site Characterization**. This WP will focus on conducting biophysical baselines at landscape and farm levels to provide data for M&E and assessment of tested technologies in targeted areas. NAFAKA has carried out extensive soil characterization in some villages in Kongwa and Kiteto districts based on soil mapping units developed from the digital terrain models of the districts (Massawe, 2012). For consistency and to allow for complementarity of information collected, the same approach will be adopted to characterize Africa RISING sites (i.e., intervention and counterfactual villages) in Kongwa and Kiteto. Options for using the AfSIS approach to characterize the Africa RISING sites will also be exploited. Farm/plot level analyses of initial soil conditions will be conducted for all trials in other work packages to provide field-level changes of soil condition associated with the tested technologies. This is a crosscutting activity, which will be implemented in collaborations with WP leaders. |
| **Deliverables**   1. Baseline report highlight soil conditions and major constraints to SI in targeted areas 2. Initial site condition of field sites targeted for on-farm trials evaluated and documented for M&E and impacts assessments |

**Work package 7. Lesson learning, networking and coordination**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Work package number** | **WP 7** | **Start date or starting event:** | | | | November 2012 to September 2013 |
| **Work package title** | Lesson learning, networking and coordination | | | | | |
| **Activity Type** | Action research type, participatory and promotional action | | | | | |
| **Target areas (Districts- Villages** | Chitego | | Laikala | Mlali | Moleti | Mvugala |
| **WP leader** | ICRISAT | | | | | |
| **Partners** | All Partners | | | | | |
| **WP budget (USD)** | 36,164 | | | | | |

|  |
| --- |
| **Relevant Africa Rising Objective: Objective 4 on Monitoring and Evaluation** |
| **Key intervention areas:** This WP will speak to the management, coordination, as well as lesson capture during implementation for up and out scaling purposes. |

|  |
| --- |
| **Description of work**  **Task 7.1. Develop communication strategy**  The Project will at the onset, develop a simple communication strategy. The Strategy will identify the key audiences that will benefit from the lessons that are expected to emerge from the Project, clarify on process for developing messages for each of the different audiences identified. The plan will also clarify on the different communication products to be developed. From the onset, the Project will produce communication products such as policy briefs, synthesis reports and companion summaries; pull-up stands for exhibitions, flyers and PowerPoint presentations.  **Task. 7.2 Networking** **and coordination**. The project will be coordinated by ICRISAT but respective leaders will lead all work packages. The action is underpinned by the need to share lessons across the partners in implementing districts and with other Africa RISING programme actors. Through this WP we will work with the other partners to develop an online repository for information, publications and documents form the project. The site will establish links with other relevant sites across the Africa RISING programme. In addition, publications and other outputs from this Action will be made available through the site. A discussion platform and information interphase will also be established to improve information.Relevant contacts list will be collated from the start of the project, with the aim of identifying key individuals to target the communications.  **Task. 7.3 Assessment of technologies and lessons learnt.** Two activities will be conducted (1), An intermediate assessment of success of interventions deployed in the target districts will be conducted. This will done by the ICRISAT be led socio-economists in conjunction with ICRAF socio-economists and IFPRI team. The team will design studies and collectively work out its implementation. This particular study will be done alongside with cots benefits analysis of WP 2 and 3. (2) A lessons learnt workshop involving project partners will be held at the end of the second year to identify lessons, and emerging issues from the project also identified in the technology diffusion studies described in (1) of this work package. It is estimated that about 25 participants will attend the workshop. |
| **Deliverables**   1. Effective communication tools developed and used to promote project interventions as well as interphase with diverse stakeholders. 2. Benefits of technologies to target communities and their suitability for intensification purposes validated. 3. Lessons for scaling up and out of the project capture and documented for roll out activities using appropriate tools developed by the project. |

# 4. PARTNERSHIPS

|  |  |
| --- | --- |
| **Nature of Partner and Institutional Affiliation** | **Role in Project** |
| **Core Partners** | |
| ICRISAT | Coordinate the project and lead WP 1, 4, 7 focusing in intensifying production of cereal and legumes. ICRISAT is a leader in R&D of legumes and cereals for semi arid tropics |
| CIMMYT | Lead activities in that involve maize and its products. In this project CIMMYT will participate in WP 1, 2 and 4. CIMMYT is a global leader in maize R&D and in this project lead maize R7D activities |
| ICRAF | Lead activities in that involve natural resources management In this project ICRAF will participate in WP, 2, 5 and 6. ICRAF is a leader in R&D agroforestry and natural resources management and will lead these WPs and contribute to WP 6. |
| ARI- Hombolo | ARI Hombolo is the NARI in the Africa RISING target regions of Tanzania. In this project ARI will be involved in all project activities but will particularly lead WP 3. |
| **Non Core Partners** | |
| ARI- Naliendele | ARI Naliendele is the NARI with mandate to lead groundnuts research in Tanzania. In this project ARI- Naliendele will be involved in all project activities focusing on use of groundnuts based technologies especially WP 1. |
| UDOM | Will participate in WP 5. Livestock feeds specialists from this institutional will engage in feds and pasture analysis and co-supervision of a graduate student |
| Pasture Research Centre Kongwa | Will participate in WP 5. Livestock feeds specialists from this institutional will engage in feds and pasture analysis |
| SUA | SUA is the leading agricultural and natural resources University in Tanzania. It will engage in WP 1,2,3,4,6 engaging in both R&D and capacity building especially in laboratory analysis and graduate student training |
| NAFAKA | Tanzania Staples Value Chain (NAFAKA) is a USAID-funded program that integrates agricultural, gender and nutritional development approaches to improve smallholder farmers’ productivity and profitability in maize and rice value chains. In this project NAFAKA sites will provide complementary and where applicable sites for learning and scaling up of interventions |

# 5. PROJECT GANTT CHART

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Work Package** | **Summary of activities** | **Begin** | **End** | **Nov** | **Dec** | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sept** | **Oct** | **Nov** |
| **WP 1** | **Onfarm evaluations** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 1.1 Community Mobilization | 1-Nov | 30-Nov |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 1.1.1 Site and farmer selection | 1-Nov | 30-Nov |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 1.2 Maize | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 1.2.1 Stress tolerance | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 1.2.2 QPM | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 1.3 Legumes | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 1.3.1 Pigeon pea | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 1.3.2 Groundnuts | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 1.3.1 Seed systems | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **WP 2** | **Integrated soil fertility management** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 2.1 Community Mobilization | 1-Nov | 30-Nov |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 2.1.1 Site and farmer selection | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 2.2 Improving fertilizer application | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 2.3 Efficient nutrient use | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 2.3.1 Improving perception on fertilizers | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 2.3.1 Evaluating intercropping | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 2.3.1 Cost benefit analysis | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **WP 3** | **Land management** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 3.1 Comm. Mobilization | 1-Nov | 30-Nov |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 3.1.1 Site and farmer selection | 1-Nov | 30-Nov |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 3.2 Soil and water conservation | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 3.2.1 Soil erosion management | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 3.2.2 Soil water management technologies | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 3 2.3 Cost benefit analysis | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **WP 4** | **Post harvest handling and Nutrition** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 4.1 Appropriate technology for storage | Apr-12 | 30-Oct |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 4.2 Processing and Utilization of legumes | Apr-12 | 30-Oct |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 4.2.1 Processing and Utilization of pegion pea | Apr-12 | 30-Oct |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 4.2.2 Processing and Utilization of groundnuts | Apr-12 | 30-Oct |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 4.3 Food safety | Apr-12 | 30-Oct |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 4.4 Household nutrition based on cereals | Apr-12 | 30-Oct |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **WP 5** | **Crop livestock integration** | Apr-12 | 30-Oct |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 5.1 Community Mobilization | Apr-12 | 30-Oct |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 5.2 Integrated crop/livestock productivity | Apr-12 | 30-Oct |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 5.3 Poultry feeds and production | Apr-12 | 30-Oct |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **WP 6** | **Characterisation of Sites** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 6.1 Community Mobilization | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 6.2 Site Characterisation | Nov-31 | 31-May |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **WP 7** | **Lesson learning and coordination** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 7.1 Communication Strategy development | Nov-31 | 28-Feb |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 7.2 Networking and Coordination | Nov-31 | Nov-31 |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Task 7.3 Lesson learning | 30-Oct | Nov-31 |  |  |  |  |  |  |  |  |  |  |  |  |  |

**6. BUDGETS**

**6.1 Summary Budget**

|  |  |  |
| --- | --- | --- |
| **Budget lines** | **Summary of activities** | **Budgeted cost USD** |
| **1. Work Packages** |  |  |
| WP 1 | **On-farm evaluations** | 163, 195 |
| WP 2 | **Integrated soil fertility management** | 71, 881 |
| WP 3 | **Land management** | 49, 619 |
| WP 4 | **Post harvest handling and Nutrition** | 57, 115 |
| WP 5 | **Crop livestock integration** | 21, 353 |
| WP 6 | **Characterisation of Sites** | 29, 433 |
| WP 7 | **Lesson learning and coordination** | 36,164 |
| **Sub total (research activities)** |  | **428, 760** |
|  | | |
| **Administrative costs** |  |  |
| **2. Overheads** |  |  |
| ICRISAT | 15% | 42,278 |
| ICRAF | 15% | 16,226 |
| CIMMYT | 15% | 6,898 |
| ARI- Hombolo | 7% | 4,292 |
| Other NARS | 7% | 1,546 |
| **Subtotal Support and Admin costs** |  | **71,240** |
| **Grand total (sum of subtotals)** |  | **500,000** |

**6.2 Budgetary allocations per institutions (USD)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Institution** | **Research** | **Overhead** | **Grand total** | **% Distribution** |
| ICRISAT | 191, 201 | 42, 278 | 233, 479 | 47 |
| ICRAF | 108, 172 | 16, 226 | 124, 398 | 25 |
| CIMMYT | 45, 989 | 6, 898 | 52, 887 | 11 |
| ARI Hombolo | 61, 308 | 4, 292 | 65, 600 | 13 |
| Others NARS actors | 22, 090 | 1, 546 | 23, 636 | 5 |
| **Totals** | **428, 760** | **71, 240** | **500, 000** | **100** |

**Notes**

1. 18% of the research budget will go directly to national institutions
2. ICISAT will charge a 5% pass through fee funds that will be channelled through it. This is included in the ICRISAT overhead.
3. Human resource costs have all been embedded as part of research costs per work package and will be handled by the Work package leaders. ICRISAT will however manage all costs of human resource recruited at national level but shared such as driver and research associate.
4. Operational costs (research, transport and communication) are all embedded with research cost for this table.
5. Each WP costs includes research costs, human, resource costs, travel both nationally and internationally. International travels mainly cover travels for partners who are from outside of Tanzania. National Travels cover local movements to and from project implementation sites and other travel arrangements within the country.

**APPENDIX 1. DETAILED BUDGET**

|  |  |  |
| --- | --- | --- |
| **1. R&D Budget Lines** | | |
| Work Package | Summary of activities | Unit cost |
| **WP 1** | **Onfarm evaluations** |  |
|  | Task 1.1 Community mobilization | 2692 |
|  | Task 1.1.1 Site and farmer selection |  |
|  | Task 1.2 Maize | 26243 |
|  | Task 1.2.1 Stress tolerance |  |
|  | Task 1.2.2 QPM |  |
|  | Task 1.3 Legumes |  |
|  | Task 1.3.1 Pigeonpea | 22495 |
|  | Task 1.3.2 Groundnuts | 22495 |
|  | Task 1.3.1 Seed systems | 44889 |
|  | Staffing costs | 36800 |
|  | Travels | 7582 |
| **Subtotal** |  | **163195** |
| **WP 2** | **Integrated soil fertility management** |  |
|  | Task 2.1 Community mobilization | 2693 |
|  | Task 2.1.1 Site and farmer selection |  |
|  | Task 2.2 Improving fertilizer application |  |
|  | Task 2.3 Efficient nutrient use | 22494 |
|  | Task 2.3.1 Improving perception on fertilizers | 4498 |
|  | Task 2.3.1 Evaluating intercropping | 14997 |
|  | Task 2.3.1 Cost benefit analysis | 3591 |
|  | Staffing costs | 21108 |
|  | Travels | 2500 |
| **Subtotal** |  | **71881** |
| **WP 3** | **Land management** |  |
|  | Task 3.1 Community mobilization | 2209 |
|  | Task 3.1.1 Site and farmer selection |  |
|  | Task 3.2 Soil and water conservation |  |
|  | Task 3.2.1 Soil erosion management | 12303 |
|  | Task 3.2.2 Soil water management technologies | 18453 |
|  | Task 3 2.3 Cost benefit analysis | 2946 |
|  | Staffing costs | 11208 |
|  | Travels | 2500 |
| **Subtotal** |  | **49619** |
| **WP 4** | **Post harvest handling and Nutrition** |  |
|  | Task 4.1 Appropriate technology for storage | 8755 |
|  | Task 4.2 Processing and utilization of legumes |  |
|  | Task 4.2.1 Processing and utilization of Pigeonpea | 8755 |
|  | Task 4.2.2 Processing and utilization of groundnuts | 8755 |
|  | Task 4.3 Food safety | 8755 |
|  | Task 4.4 Household nutrition based on cereals | 8755 |
|  | Staffing costs | 9340 |
|  | Travels | 4000 |
| **Subtotal** |  | **57115** |
| **WP 5** | **Crop livestock integration** |  |
|  | Task 5.1 Community mobilization | 2693 |
|  | Task 5.2 Integrated crop/livestock productivity | 7182 |
|  | Task 5.3 Poultry feeds and production | 8978 |
|  | Travels | 2500 |
| **Subtotal** |  | **21353** |
| **WP 6** | **Characterisation of Sites** |  |
|  | Task 6.1 Community mobilization |  |
|  | Task 6.2 Site Characterisation | 26933 |
|  | Travels | 2500 |
| **Subtotal** |  | **29433** |
| **WP 7** | **Lesson learning and coordination** |  |
|  | Task 7.1 Communication5 strategy development | 1500 |
|  | Task 7.2 Networking and coordination | 3000 |
|  | Task 7.3 Lesson learning | 5249 |
|  | Staffing costs | 22416 |
|  | Travels | 4000 |
| **Subtotal** |  | **36164** |
|  |  |  |
| **Total Research Activities** | | **428760** |
|  |  |  |
| **2. Overheads** |  |  |
| ICRISAT | 15% | 42278 |
| ICRAF | 15% | 16226 |
| CIMMYT | 15% | 6898 |
| ARI- Hombolo | 7% | 4292 |
| Other NARS | 7% | 1546 |
| **Subtotal** |  | **71240** |
| **Grand Total** |  | **500000** |

**Budgetary Notes:**

**1. Personnel Costs**

Costs for CGIAR are based on a unit cost of 160,000 USD per year. The costs are broken down into

1. Coordinator costs= 15 staff time = 160,000 x.15= 22,416 USD
2. Scientist time =Ca 11% staff time = 16,0000 x .11= 17746
3. National staff = 934 USD per month = 11208 USD per year

**2. Overheads**

These are charged as indicated in the detailed budget

1. [↑](#footnote-ref-1)
2. United Republic of Tanzania. 2010. The comprehensive Africa agriculture development programme (CAADP). Post compact road map for Tanzania July 2010. [↑](#footnote-ref-2)
3. ASDP, 2005. Agricultural Sector Development Programme. Support Through the ASDP Basket Fund. Government Programme Document [↑](#footnote-ref-3)
4. IFAD, 2001. Rural Poverty in Tanzania. International Fund for Agricultural Development. [↑](#footnote-ref-4)
5. Mkenda, A.F., Luvanda, E.G., Rutasitara, L. and Naho, A. 2004. Poverty in Tanzania: Comparisons across administrative regions. Interim report. [↑](#footnote-ref-5)
6. Kimaro, A.A., V.R. Timmer, S.O.A. Chamshama, Y.N. Ngaga, and D.A. Kimaro. 2009. Competition between maize and pigeon pea in semi-arid Tanzania: Effect on yields and nutrition of crops. Agric. Ecosyst. Environ. 134:115–125. [↑](#footnote-ref-6)
7. Isaac, M.E. and Kimaro, A.A. 2011. Diagnosis of nutrient imbalances with vector analysis in agroforestry systems. Journal of Environmental Quality 40: 860 – 866 [↑](#footnote-ref-7)
8. Drinkwater, L.E., and S.S. Snapp. 2007. Nutrients in agroecosystems: Rethinking the management paradigm. Adv. Agron. 92:164–186. [↑](#footnote-ref-8)
9. Vanlauwe, B. and K.E. Giller. 2006. Popular myths around fertility management in sub-Saharan Africa. Agric. Ecosyst. Environ. 116: 34 – 46 [↑](#footnote-ref-9)
10. Snapp, S.S., Rohrbach, D.D., Simtowe, F., Freeman, H.A., 2002. Sustainable soil management options for Malawi: can smallholder farmers grow more legumes? Agric. Ecosyst. Environ. 91, 159–174 [↑](#footnote-ref-10)
11. Kimaro, A.A., V.R. Timmer, S.O.A. Chamshama, Y.N. Ngaga, and D.A. Kimaro. 2009. Competition between maize and pigeon pea in semi-arid Tanzania: Effect on yields and nutrition of crops. Agric. Ecosyst. Environ. 134:115–125. [↑](#footnote-ref-11)
12. Vandermeer, J. 1989. The ecology of intercropping. Cambridge University Press, Cambridge,. 237 pp. [↑](#footnote-ref-12)